

Greenhagen, Andrew

From: ADMComments
Sent: Thursday, June 19, 2014 1:29 PM
To: Greenhagen, Andrew
Subject: FW: (015143029) ADM Carbon Sequestration Public Comments

-----Original Message-----

From: idaemon@unixmail.rtpnc.epa.gov [mailto:idaemon@rtpnc.epa.gov]
Sent: Thursday, May 15, 2014 1:31 PM
To: ADMComments
Subject: (015143029) ADM Carbon Sequestration Public Comments

2-Name

Mark Denzler

3-Organization

Illinois Manufacturers' Association

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mdenzler@ima-net.org

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220 E. Adams Street

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Springfield

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IL

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62701

9-Comments

May 15, 2014

Mr. Allan Batka

Region 5

United States Environmental Protection Agency

77 W. Jackson Blvd.

Chicago IL 60604-3590

RE: Archer Daniels Midland VI UIC Permit Applications

Dear Mr. Batka:

On behalf of the Illinois Manufacturers' Association (IMA), I respectfully urge the United States Environmental Protection Agency (USEPA) to approve the Class VI injection well permit applications submitted by Archer Daniels Midland (ADM).

The Illinois Manufacturers' Association is the oldest and one of the largest state manufacturing trade associations in the United States. Founded in 1893, the IMA represents nearly 4,000 member companies and facilities that employ 580,000 workers and contribute the single largest share of the Gross State Product.

Carbon capture and sequestration is an exciting new technology and ADM's permits will provide commercial demonstration of an integrated system to capture CO₂ from an ethanol plant with geologic storage in a saline reservoir.

If approved, this project will significantly reduce carbon emissions that equate to removing 200,000 automobiles from the roads for one year.

ADM's project will have a significant positive short-term and long-term economic impact both locally and across the United States. The private sector is investing \$66 million of the total \$205 million project resulting in the creation of more than 900 new good-paying jobs including 350 in the local community. Area businesses will see \$30 million in increased economic activity.

Moving forward, this technology could be used in a CO2 pipeline and enhanced oil recovery project in Southern Illinois with an initial project cost of \$300 million. This new pipeline could help with production of more than 700 million barrels of oil.

Approving these permits will have both a positive environmental and economic impact and the IMA encourages your quick approval.

Thank you.

Mark Denzler
Vice President & COO

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WARNING NOTICE

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Greenhagen, Andrew

From: ADMComments
Sent: Thursday, June 19, 2014 1:28 PM
To: Greenhagen, Andrew
Subject: FW: ADM Class VI well comments

From: Hoback, Bill [mailto:Bill.Hoback@illinois.gov]
Sent: Thursday, May 22, 2014 11:22 AM
To: ADMComments
Cc: Murphy, Michael
Subject: ADM Class VI well comments

**Comments of the
Illinois Department of Commerce and Economic Opportunity's
Office of Coal Development
In support
Of the Archer Daniels Midland Carbon Storage Class VI Well in Decatur, Illinois**

Since 2003 the Office of Coal Development has been an active partner with the Illinois State Geological Survey to identify the storage capabilities for carbon capture and storage projects within geological formations in the State of Illinois.

The first ADM Carbon Capture and Storage Project is fast approaching the 1 Million Metric Ton milestone as one of the nation's first large scale CCS projects. It has accomplished a lot in a very short time.

As only the second Class VI well application the US EPA has taken to a hearing, I am aware of the scrutiny that the permitting process, testimony and US EPA's responses will receive.

After reviewing the criteria used by the US EPA to evaluate the technical and project specific information, I am confident that the US EPA's efforts to evaluate all available information to reach the decision to issue this draft permit was comprehensive and accountable to the citizens of Decatur and Macon County and the people of the State of Illinois.

Illinois offers some of the best sequestration geology anywhere. The Mt. Simon Sandstone, in this case, is a thick large-capacity porous rock layer... filled with briny water.

These ADM CCS projects help support carbon emitting projects meet the next level of emission reductions by capturing carbon dioxide and permanently storing it underground.

Projects like the ADM CO2 storage projects and the FutureGen project in Morgan County will help make the great strides needed to achieve an "all of the above" domestic energy portfolio strategy while meeting increasingly more stringent environmental regulations.

Thank you.

Bill Hoback

Deputy Director, Office of Coal Development

Department of Commerce and Economic Opportunity

500 East Monroe, R-11

Springfield, IL 62701

Phone: 217-782-6370

Email: bill.hoback@illinois.gov

Web: <http://www.illinois.gov/dceo/whyillinois/KeyIndustries/Energy/Coal/Pages/default.aspx>

Greenhagen, Andrew

From: ADMComments
Sent: Thursday, June 19, 2014 1:28 PM
To: Greenhagen, Andrew
Subject: FW: ADM Carbon Sequestration Draft Permit - Comments
Attachments: ADM Carbon Sequestration Draft Permit - Comments.pdf; ADM Comments UIC Class VI Permit.xlsx

Importance: High

From: Murawski, Steven [mailto:Steven.Murawski@adm.com]
Sent: Friday, May 30, 2014 11:39 AM
To: ADMComments
Subject: ADM Carbon Sequestration Draft Permit - Comments
Importance: High

To Whom It May Concern,

Please find attached our company's timely comments on the ADM Carbon Sequestration Draft Permit.

For your convenience, we have also included our company's comments in Excel spreadsheet format (i.e., without the cover letter).

In addition to this electronic copy of our comments, a hard copy is also being sent today by certified mail, return receipt requested.

Please contact Scott McDonald at scott.mcdonald@adm.com or (217) 451-5142 if you have any questions or require additional information.

Take care,

Steven J. Murawski
Corporate Environmental Counsel
Archer Daniels Midland Company
4666 Faries Parkway
Decatur, IL 62526
O: 217-451-7918
M: 217-358-9881
F: 217-424-6196
steven.murawski@adm.com

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May 30, 2014

via E-Mail (ADMComments@epa.gov)
and Certified Mail

Allan Batka
U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard (WU-16J)
Chicago, Illinois 60604-3590

RE: ADM Carbon Sequestration Draft Permit - Comments

Dear Mr. Batka:

On behalf of Archer Daniels Midland Company (Company), I am timely forwarding the enclosed comments regarding the ADM Carbon Sequestration Draft Permit.

If you have any questions or would like any additional information, please contact me at scott.mcdonald@adm.com or (217) 451-5142.

Sincerely,

A handwritten signature in blue ink that reads "Scott McDonald". The signature is fluid and cursive, with the first name "Scott" and last name "McDonald" clearly legible.

Scott McDonald
Project Director, IL-ICCS Project

Item #	Document	Page	Provision	Text of Draft Permit or Attachment	Proposed Revision	Reference	Comment
1	Permit	4	G(1)	The permittee shall maintain and comply with the approved Area of Review and Corrective Action Plan (Attachment B of this permit) which is an enforceable condition of this permit and shall meet the requirements of 40 CFR 146.84.	The permittee shall maintain and comply with the approved Area of Review and Corrective Action Plan (Attachment B of this permit) which is an enforceable condition of this permit and shall meet the requirements of 40 CFR 146.84.		Complying with the approved Area of Review and Corrective Action Plan does ipso facto meet the requirements of 40 CFR 146.84. There is not a requirement to comply with the plan and –in addition—comply with some other potential interpretation of the requirements of 146.84. By issuing this permit, EPA has determined that compliance with the plan during the term of the permit constitutes compliance with 146.84.
2	Permit	5	G(2)	2. At the fixed frequency specified in the Area of Review and Corrective Action Plan, or more frequently when monitoring and operational conditions warrant, the permittee must reevaluate the area of review and perform corrective action in the manner specified in 40 CFR 146.84 and update the Area of Review and Corrective Action Plan or demonstrate to the Director that no update is needed.	2. The permittee has submitted an Area of Review and Corrective Action Plan, which is included in Attachment B of this permit. This plan describes how the permittee must reevaluate the area of review and perform corrective action in the manner specified in 40 CFR 146.84, demonstrates how each of the applicable requirements of Section 146.84 will be met, and is an enforceable condition of the permit.	146.84(b) The owner or operator of a Class VI well must prepare, maintain, and comply with a plan to delineate the area of review for a proposed geologic sequestration project, periodically reevaluate the delineation, and perform corrective action that meets the requirements of this section and is acceptable to the Director. The requirement to maintain and implement an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit. As a part of the permit application for approval by the Director, the owner or operator must submit an area of review and corrective action plan that includes the following information: * * * * (2) A description of: (i) The minimum fixed frequency, not to exceed five years, at which the owner or operator proposes to reevaluate the area of review; (ii) The monitoring and operational conditions that would warrant a reevaluation of the area of review prior to the next scheduled reevaluation as determined by the minimum fixed frequency established in paragraph (b)(2)(i) of this section.	The permittee has submitted the Area of Review and Corrective Action Plan. Complying with the approved Area of Review and Corrective Action Plan does ipso facto meet the requirements of 40 CFR 146.84.
3	Permit	5	G(3)	3. Following each AoR reevaluation or a demonstration that no evaluation is needed, the permittee shall submit the resultant information in an electronic format to the Director for review and approval of the AoR results.	G.3. Following each AoR reevaluation or a demonstration that no evaluation is needed, the permittee shall submit either the resultant information updated area of review and corrective action plan in an electronic format to the Director for review and approval of the AoR results, or a demonstration that no update is needed.	146.84(c)(4) Submit an amended area of review and corrective action plan or demonstrate to the Director through monitoring data and modeling results that no amendment to the area of review and corrective action plan is needed. Any amendments to the area of review and corrective action plan must be approved by the Director, must be incorporated into the permit, and are subject to the permit modification requirements at §§ 144.39 or 144.41 of this chapter, as appropriate.	The language in the draft permit is awkwardly worded and the reference to “resultant information” is potentially open-ended. The regulation requires the permittee to submit either an amended plan or a demonstration that amendment is unnecessary.
4	Permit	6	I(2)	2. Casing and Cementing – Casing and cement or other materials used in the construction of the well must have sufficient structural strength for the life of the geologic sequestration project. All well materials must be compatible with all fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director. The casing and cementing program must prevent the movement of fluids into or between USDWs for the expected life of the well in accordance with 40 CFR 146.86. The casing and cement used in the construction of this well are shown in Attachment G of this permit and in the administrative record for this permit. Any change must be submitted in an electronic format for approval by the Director before installation.	2. Casing and Cementing – The permittee has demonstrated to the satisfaction of the Director that the casing and cement or other materials to be used in the construction of the well must have sufficient structural strength for the life of the geologic sequestration project. —All well materials must be are compatible with all fluids with which the materials may be expected to come into contact, and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director. —The casing and cementing program must prevent the movement of fluids into or between USDWs for the expected life of the well in accordance with 40 CFR 146.86. The casing and cement used in the construction of this well are shown in Attachment G of this permit and in the administrative record for this permit. Any change must be submitted in an electronic format for approval by the Director before installation.		Condition is written in a way that suggests that compliance requires something beyond following the approved construction plan.
5	Permit	6	I(3)	3. Tubing and Packer Specifications – Tubing and packer materials used in the construction of the well must be compatible with fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director. The permittee shall inject only through tubing with a packer set within the long string casing at a point within or below the confining zone immediately above the injection zone. The tubing and packer used in the well are represented in engineering drawings contained in Attachment G of this permit. Any change must be submitted in an electronic format for approval by the Director before installation.	3. Tubing and Packer Specifications – Tubing and packer materials used in the construction of the well must be compatible with fluids with which the materials may be expected to come into contact and must meet or exceed standards developed for such materials by the American Petroleum Institute, ASTM International, or comparable standards acceptable to the Director. The permittee shall inject only through tubing with a packer set within the long string casing at a point within or below the confining zone immediately above the injection zone. The tubing and packer used in the well are as represented in engineering drawings contained in Attachment G of this permit. Any change must be submitted in an electronic format for approval by the Director before installation.		Condition is written in a way that suggests that compliance requires something beyond following the approved construction plan.

Item #	Document	Page	Provision	Text of Draft Permit or Attachment	Proposed Revision	Reference	Comment
6	Permit	7	J.1.b & J.1.d	Whole cores or sidewall cores of the injection zone and confining system and formation fluid samples from the injection zone that meet the requirements of 40 CFR 146.87(b);	Clarification Only	40 CFR 146.87(b) The owner or operator must take whole cores or sidewall cores of the injection zone and confining system and formation fluid samples from the injection zone(s). 40 CFR 146.87(d) At a minimum, the owner or operator must determine or calculate the following information concerning the injection and confining zone(s): (3) Physical and chemical characteristics of the formation fluids in the injection zone(s).	The regulations state that fluid samples must be taken from the injection zone but do not require that these samples be taken from the injection well itself. The draft condition uses essentially similar language, meaning that the fluid samples need not be taken directly from the injection zone. The permittee plans to collect the requisite injection zone fluid samples from VW#2.
7	Permit	7	J(1)(d)	(d) Tests to provide information about the injection and confining zones, including calculated fracture pressure and the physical and chemical characteristics of the injection and confining zones and the formation fluids in the injection zone that meet the requirements of 40 CFR 146.87(d); and	(d) Tests as necessary to provide information about the injection and confining zones. including to allow determination or calculation of fracture pressure and the physical and chemical characteristics of the injection and confining zones and the formation fluids in the injection zone that meet the requirements of 40 CFR 146.87(d); and	146.87(d) At a minimum, the owner or operator must determine or calculate the following information concerning the injection and confining zone(s): (1) Fracture pressure; (2) Other physical and chemical characteristics of the injection and confining zone(s); and (3) Physical and chemical characteristics of the formation fluids in the injection zone(s).	The applicable provision here is to make a determination or calculation. This may not require any additional testing.
8	Permit	8	K(1)	1. Injection Pressure Limitation – Except during stimulation, the permittee must ensure that injection pressure does not exceed 90 percent of the fracture pressure of the injection zone(s) so as to ensure that the injection does not initiate new fractures or propagate existing fractures in the injection zone(s). In no case shall injection pressure initiate fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW. The maximum injection pressure limit is listed in Attachment A.	1. Injection Pressure Limitation – Except during stimulation, the permittee must ensure that injection pressure does not exceed the maximum injection pressure limit listed in Attachment A. In no case shall injection pressure initiate fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW.		The applicable requirement is to comply with the maximum pressure limitation in the permit. The rest of what is specified in this condition has already been accomplished as a basis for setting that limit.
9	Permit	9	K(9)(a)	(a) The permittee must shut-in the well by gradual reduction in the injection pressure as outlined in Attachment C of this permit; or	(a) The permittee must shut-in the well in a manner to ensure protection of health, safety, and the environment as outlined in Attachments A & C of this permit; or		Permittee will have a standard shutdown procedure that ensures protection of health, safety, and the environment. The regulations do not require this procedure (outside of the ERRP) be detailed as a permit condition. The permittee must have the freedom to exercise judgement as to the type of shutdown to employ under various non-emergency conditions.
10	Permit	9	K(8)	8. Circumstances Under Which Injection Must Cease – Injection shall cease when any of the following circumstances arises: (a) Failure of the well to pass a mechanical integrity test; (b) A loss of mechanical integrity during operation; (c) The automatic alarm or automatic shut-off system is triggered; (d) A significant unexpected change in the annulus or injection pressure; (e) The Director determines that the well lacks mechanical integrity; or (f) The permittee is unable to maintain compliance with any permit condition or regulatory requirement and the Director determines that injection should cease.	8. Circumstances Under Which Injection Must Cease – Injection shall cease when any of the following circumstances arises: (a) Failure of the well to pass a mechanical integrity test; (b) A loss of mechanical integrity during operation; (c) If, upon such investigation, the well appears to be lacking mechanical integrity after (1) the automatic alarm or automatic shut-off system is triggered or ; (d)(2) A significant unexpected change in the annulus or injection pressure; (e)(d) The Director determines that the well lacks mechanical integrity ; or (f)(e) The permittee is unable to maintain compliance with any permit condition or regulatory requirement and the Director determines that injection should cease.	146.88(f) If a shutdown (i.e., down-hole or at the surface) is triggered or a loss of mechanical integrity is discovered, the owner or operator must immediately investigate and identify as expeditiously as possible the cause of the shutoff. If, upon such investigation, the well appears to be lacking mechanical integrity, or if monitoring required under paragraph (e) of this section otherwise indicates that the well may be lacking mechanical integrity, the owner or operator must: (1) Immediately cease injection; (2) Take all steps reasonably necessary to determine whether there may have been a release of the injected carbon dioxide stream or formation fluids into any unauthorized zone; (3) Notify the Director within 24 hours; (4) Restore and demonstrate mechanical integrity to the satisfaction of the Director prior to resuming injection; and (5) Notify the Director when injection can be expected to resume. 146.94(b) If the owner or operator obtains evidence that the injected carbon dioxide stream and associated pressure front may cause an endangerment to a USDW, the owner or operator must: (1) Immediately cease injection; (2) Take all steps reasonably necessary to identify and characterize any release; (3) Notify the Director within 24 hours; and (4) Implement the emergency and remedial response plan approved by the Director.	The permit condition is not consistent with the regulatory requirement, and the requirement to cease injection when there is "a significant unexpected change in the annulus or injection pressure" is ambiguous.

Item #	Document	Page	Provision	Text of Draft Permit or Attachment	Proposed Revision	Reference	Comment
11	Permit	12	M(1)(a)	(a) The permittee shall maintain and comply with the approved Testing and Monitoring Plan (Attachment C of this permit) and with the requirements at 40 CFR 144.51(j), 146.88(e), and 146.90. The Testing and Monitoring Plan is an enforceable condition of this permit. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Procedures for all testing and monitoring under this permit must be submitted to the Director in an electronic format for approval at least 30 days prior to the test. In performing all testing and monitoring under this permit, the permittee must follow the procedures approved by the Director. If the permittee is unable to follow the EPA approved procedures, then, the permittee must contact the Director at least 30 days prior to testing to discuss options, if any are feasible. When the test report is submitted, a full explanation must be provided as to why any approved procedures were not followed. If the approved procedures were not followed, EPA may take an appropriate action, including but not limited to, requiring the permittee to re-run the test.	(a) The permittee shall maintain and comply with the approved Testing and Monitoring Plan (Attachment C of this permit) and to meet the requirements at 40 CFR 144.51(j), 146.88(e), and 146.90. The Testing and Monitoring Plan is an enforceable condition of this permit. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. Procedures for all testing and monitoring under this permit must be submitted to the Director in an electronic format for approval at least 30 days prior to the test. In performing all testing and monitoring under this permit, the permittee must follow the procedures approved by the Director. If the permittee is unable to follow the EPA approved procedures, then, the permittee must contact the Director at least 30 days prior to testing to discuss options, if any are feasible. When the test report is submitted, a full explanation must be provided as to why any approved procedures were not followed. If the approved procedures were not followed, EPA may take an appropriate action, including but not limited to, requiring the permittee to re-run the test.		By issuing the permit, EPA has determined that implementing the Testing and Monitoring Plan does meet the requirements of 40 CFR 144.51(j), 146.88(e), and 146.90. The procedures are detailed in this plan making them an enforceable condition of the permit.
12	Permit	13	M(2)	2. Carbon Dioxide Stream Analysis – The permittee shall analyze the carbon dioxide stream with sufficient frequency to yield data representative of its chemical and physical characteristics, as described in the Testing and Monitoring Plan and to meet the requirements of 40 CFR 146.90(a).	2. Carbon Dioxide Stream Analysis – The permittee shall analyze the carbon dioxide stream with sufficient frequency to yield data representative of its chemical and physical characteristics, as described in the Testing and Monitoring Plan and to meet the requirements of 40 CFR 146.90(a).		By issuing the permit, EPA has determined that implementing the Testing and Monitoring Plan does meet the requirements of 40 CFR 146.90(a).
13	Permit	13	M(4)	4. Corrosion Monitoring – The permittee shall perform corrosion monitoring of the well materials for loss of mass, thickness, cracking, pitting, and other signs of corrosion on a quarterly basis using the procedures described in the Testing and Monitoring Plan and in accordance with 40 CFR 146.90(c) to ensure that the well components meet the minimum standards for material strength and performance set forth in 40 CFR 146.86(b).	4. Corrosion Monitoring – The permittee shall perform corrosion monitoring of the well materials for loss of mass, thickness, cracking, pitting, and other signs of corrosion on a quarterly basis using the procedures described in the Testing and Monitoring Plan and in accordance with 40 CFR 146.90(c) to ensure that the well components meet the minimum standards for material strength and performance set forth in 40 CFR 146.86(b).		By issuing the permit, EPA has determined that implementing the Testing and Monitoring Plan does meet the requirements of 40 CFR 146.86(b) & 40 CFR 146.90(c).
14	Permit	14	M(8)	(a) The permittee shall use direct methods to track the position of the carbon dioxide plume and the pressure front in the injection zone as described in the Testing and Monitoring Plan and to meet the requirements of 40 CFR 146.90(g)(1). (b) The permittee shall use indirect methods to track the position of the carbon dioxide plume and pressure front as described in the Testing and Monitoring Plan and to meet the requirements of 40 CFR 146.90(g)(2).	(a) The permittee shall use direct methods to track the position of the carbon dioxide plume and the pressure front in the injection zone as described in the Testing and Monitoring Plan and to meet the requirements of 40 CFR 146.90(g)(1). (b) The permittee shall use indirect methods to track the position of the carbon dioxide plume and pressure front as described in the Testing and Monitoring Plan and to meet the requirements of 40 CFR 146.90(g)(2).		By issuing the permit, EPA has determined that implementing the Testing and Monitoring Plan does meet the applicable requirements of 40 CFR 146.90(g)(1) & 40 CFR 146.90(g)(2).
15	Permit	18	O(1)	1. Well Plugging Plan – The permittee shall maintain and comply with the approved Well Plugging Plan (Attachment D of this permit) which is an enforceable condition of this permit and shall meet the requirements of 40 CFR 146.92.	1. Well Plugging Plan – The permittee shall maintain and comply with the approved Well Plugging Plan (Attachment D of this permit) which is an enforceable condition of this permit and shall meet the requirements of 40 CFR 146.92.		By issuing the permit, EPA has determined that implementing the Well Plugging Plan does meet the applicable requirements of 40 CFR 146.92.
16	Permit	19	O(6)(b)	(b) The permittee shall monitor the site following the cessation of injection to show the position of the carbon dioxide plume and pressure front and demonstrate that USDWs are not being endangered, as specified in the Post-Injection Site Care and Site Closure Plan and in 40 CFR 146.90, and 40 CFR 146.93, including:	(b) The permittee shall monitor the site following the cessation of injection to show the position of the carbon dioxide plume and pressure front and demonstrate that USDWs are not being endangered, as specified in the Post-Injection Site Care and Site Closure Plan and to meet the requirements of 40 CFR 146.90, and 40 CFR 146.93, including:		By issuing the permit, EPA has determined that implementing the Post-Injection Site Care and Site Closure Plan does meet the applicable requirements of 40 CFR 146.90, and 40 CFR 146.93.
17	Permit	20	O(6)(b)(v)	(v) The permittee shall continue to conduct post-injection site monitoring for at least 50 years or for the duration of any alternative timeframe approved pursuant to 40 CFR 146.93(c) and the Post-Injection Site Care and Site Closure Plan.	(v) The permittee shall continue to conduct post-injection site monitoring until the Director has authorized site closure. for at least 50 years or for the duration of any alternative timeframe approved pursuant to 40 CFR 146.93(c) and the Post-Injection Site Care and Site Closure Plan.	146.93(b) (2) If the owner or operator can demonstrate to the satisfaction of the Director before 50 years or prior to the end of the approved alternative timeframe based on monitoring and other site-specific data, that the geologic sequestration project no longer poses an endangerment to USDWs, the Director may approve an amendment to the post-injection site care and site closure plan to reduce the frequency of monitoring or may authorize site closure before the end of the 50-year period or prior to the end of the approved alternative timeframe, where he or she has substantial evidence that the geologic sequestration project no longer poses a risk of endangerment to USDWs.	There are a number of different scenarios that would allow the permittee to cease post-injection monitoring before 50 years, but all involve obtaining authorization for site closure.

Item #	Document	Page	Provision	Text of Draft Permit or Attachment	Proposed Revision	Reference	Comment
18	Permit	20	O(6)(d)	(d) Prior to authorization for site closure, the permittee shall submit to the Director for review and approval, in an electronic format, a demonstration, based on information collected pursuant to Section O(5)(b) of this permit, that the carbon dioxide plume and the associated pressure front do not pose an endangerment to USDWs and that no additional monitoring is needed to ensure that the project does not pose an endangerment to USDWs, as required under 40 CFR 146.93(b)(3). The Director reserves the right to amend the post-injection site monitoring requirements (including extend the monitoring period) if the carbon dioxide plume and the associated pressure front have not stabilized or there is a concern that USDWs are being endangered.	(d) Prior to authorization for site closure, the permittee shall submit to the Director for review and approval, in an electronic format, a demonstration, based on information collected pursuant to Section O(5)(b) of this permit, that the carbon dioxide plume and the associated pressure front do not pose an endangerment to USDWs and that no additional monitoring is needed to ensure that the project does not pose an endangerment to USDWs, as required under 40 CFR 146.93(b)(3). The Director reserves the right to amend the post-injection site monitoring requirements (including extend the monitoring period) if the carbon dioxide plume and the associated pressure front have not stabilized or there is a concern that USDWs are being endangered.	146.93(b) (3) Prior to authorization for site closure, the owner or operator must submit to the Director for review and approval a demonstration, based on monitoring and other site-specific data, that no additional monitoring is needed to ensure that the geologic sequestration project does not pose an endangerment to USDWs.	There is no requirement for the carbon dioxide plume and the associated pressure front to "stabilize". If the term is retained in this condition, it must be clear that the use of the word "stabilized" in this context is not intended to imply that a complete cessation in the movement of injected or formation fluids in the injection zone is necessary to meet the closure requirement. It should be sufficient to demonstrate that current monitoring and model(s) show that the injected CO2 stream is not expected to migrate in the future in a manner likely to result in endangerment of a USDW.
19	Permit	20	O(6)(f)	(f) After the Director has authorized site closure, the permittee shall plug all monitoring wells as specified in Attachment E of this permit – the Post-Injection Site Care and Site Closure Plan – in a manner which will not allow movement of injection or formation fluids that endangers a USDW. The permittee shall also restore the site to its pre-injection condition.	(f) After the Director has authorized site closure, the permittee shall plug all monitoring wells as specified in Attachment E of this permit – the Post-Injection Site Care and Site Closure Plan – in a manner which will not allow movement of injection or formation fluids that endangers a USDW. The permittee shall also restore the site to its pre-injection condition.		There is no regulatory requirement for site restoration. To restore the site to its pre-injection condition following site closure, the permittee will be guided by the state rules for plugging and abandonment of wells located on leased property under The Illinois Oil and Gas Act: Title 62: Mining Chapter I: Department of Natural Resources - Part 240, Section 240.1170 - Plugging Fluid Waste Disposal and Well Site Restoration.
20	Permit	21	P(1)	1. The Emergency and Remedial Response Plan describes actions the permittee must take to address movement of the injection or formation fluids that may cause an endangerment to a USDW during construction, operation, and post-injection site care periods. The permittee shall maintain and comply with the approved Emergency and Remedial Response Plan (Attachment F of this permit), which is an enforceable condition of this permit, and with 40 CFR 146.94.	1. The Emergency and Remedial Response Plan describes actions the permittee must take to address movement of the injection or formation fluids that may cause an endangerment to a USDW during construction, operation, and post-injection site care periods. The permittee shall maintain and comply with the approved Emergency and Remedial Response Plan (Attachment F of this permit), which is an enforceable condition of this permit, and with meets the requirements of 40 CFR 146.94.		By issuing the permit, the EPA has determined that implementing the Emergency and Remedial Response Plan does meet the applicable requirements of 40 CFR 146.94.
21	A	1	Injection Well Operating Conditions	PARAMETER/CONDITION Annulus Pressure = 100 minimum psig Annulus Pressure/Tubing Differential = 100 psig above surface injection pressure	PARAMETER/CONDITION Annulus Pressure = 400 psig minimum Annulus - Tubing Pressure Differential at Tubing Packer = 100 psig minimum		The table is not correct and needs to accurately reflect what is detailed in the Testing and Monitoring Plan. From the Testing and Monitoring Plan page C5 the permittee will: 2. The surface annulus pressure will be kept at a minimum of 400 pounds per square inch (psi) during injection, 4. The pressure within the annular space, over the interval above the packer to the confining layer, will be greater than the pressure of the injection zone formation at all times, and 5. The pressure in the annular space directly above the packer will be maintained at least 100 psi higher than the adjacent tubing pressure during injection.
22	A	1	Summary Requirements	Under routine conditions (e.g., for well workovers), the permittee will reduce CO2 injection at a rate of 500 tons per day over a 6 day period to ensure protection of health, safety, and the environment. (Procedures that address immediately shutting in the well are in Attachment F (Emergency and Remedial Response Plan) of this permit).	Under routine conditions (e.g., for well workovers), the permittee will reduce CO2 injection at a rate of 500 tons per day over a 6 day period to ensure protection of health, safety, and the environment. (Procedures that address immediately shutting in the well are in Attachment F (Emergency and Remedial Response Plan) of this permit).		Permittee will have a standard shutdown procedure that ensures protection of health, safety, and the environment. The regulations do not require this procedure (outside of the ERRP) be detailed as a permit condition. The permittee must have the freedom to exercise judgement as to the type of shutdown to employ under various non-emergency conditions.
23	B	9	Boundary Conditions	<u>Boundary Conditions</u> No-flow boundary conditions were applied to the upper and lower boundaries of the model, with the assumption that the reservoir and the caprock are continuous throughout the region. A pore volume multiplier of 1,000 was applied to each cell in the horizontal boundaries of the ECLIPSE model in order to simulate an extensive reservoir. The horizontal boundaries were selected as: hydrostatic initial conditions for the aqueous phase, no-flow conditions for the gas phase, and initial conditions for salt.	<u>Boundary Conditions</u> No-flow boundary conditions were applied to the upper and lower boundaries of the model, with the assumption that the reservoir and the caprock are continuous throughout the region. A pore volume multiplier of 10,000 was applied to each cell in the horizontal boundaries of the ECLIPSE model in order to simulate an extensive reservoir. The horizontal boundaries were selected as: hydrostatic initial conditions for the aqueous phase, no-flow conditions for the gas phase, and initial conditions for salt.		Boundary condition multiplier = 1,000. Should be 10,000
24	B	19	Triggers	• Pressure: Changes in pressure that are unexpected and outside three (3) standard deviations from the average will trigger a new evaluation of the AoR. • Temperature: Changes in temperature that are unexpected and outside three (3) standard deviations from the average will trigger a new evaluation of the AoR.	• Pressure: Changes in pressure <u>during normal operations</u> that are unexpected and outside three (3) standard deviations from the average will trigger a new evaluation of the AoR. • Temperature: Changes in temperature <u>during normal operation</u> that are unexpected and outside three (3) standard deviations from the average will trigger a new evaluation of the AoR.		During periods of start up and shutdown the temperature and pressure may fluctuate outside three (3) standard deviations and should not trigger an AoR revision.

Item #	Document	Page	Provision	Text of Draft Permit or Attachment	Proposed Revision	Reference	Comment
25	C	3	Table 2 Sampling/Monitoring Locations	Injection Pressure Monitoring Reservoir - Below Packer Temperature Monitoring Reservoir - Below Packer Temperature Monitoring Along wellbore using distributed temperature sensor (DTS)	Injection Pressure Monitoring Reservoir - Proximate to Packer Temperature Monitoring Reservoir - Proximate to Packer Temperature Monitoring Along wellbore to packer using distributed temperature sensor (DTS)		The pressure and temperature gauges are proximate to the packer. The DTS will terminate at the tubing packer.
26	C	3	Instrument Calibration	Pressure and temperature instruments shall be calibrated over the full operational range at least annually using ANSI or other recognized standards. Pressure transducers shall have a drift stability of less than 1 psi over the operational period of the instrument and an accuracy of + 5 psi. Sampling rates will be at least once per 5 seconds. Temperature sensors will be accurate to within one degree Celsius.	Above ground pressure and temperature instruments shall be calibrated over the full operational range at least annually using ANSI or other recognized standards. Pressure transducers shall have a drift stability of less than 1 psi over the operational period of the instrument and an accuracy of + 5 psi. Sampling rates will be at least once per 5 seconds. Temperature sensors will be accurate to within one degree Celsius.		The permittee will be not be able to calibrate the permanently installed subsurface gauges.
27	C	5	Continuous Monitoring of Annular Pressure	1. The annulus between the tubing and the long string of casing will be filled with brine. The brine will have a specific gravity of 1.25 and a density of 10.5 lbs/gal. The hydrostatic gradient is 0.546 psi/ft. The brine will contain a corrosion inhibitor.	1. The annulus between the tubing and the long string of casing will be filled with brine. The brine will have a specific gravity of 4.25 -1.26 and a density of 10.5 lbs/gal. The hydrostatic gradient is 0.546 psi/ft. The brine will contain a corrosion inhibitor.		The specific gravity of the 10.5 lbs/gal brine will be 1.26.
28	C	5	Testing and Monitoring Plan	During periods of well shut down, the surface annulus pressure will be kept at a minimum pressure to maintain a pressure differential of at least 100 psi between the annular fluid directly above (higher pressure) and below (lower pressure) the injection tubing packer set at 6,320 ft KB.	During periods of well shut down, the surface annulus pressure will be kept at a minimum pressure to maintain a pressure differential of at least 100 psi between the annular fluid directly above (higher pressure) and below (lower pressure) the injection tubing packer set at approximately 6,320 ft KB.		The packer depth has not been set and will not be known until well completion.
29	C	12	Table 5 St. Peter Fluid Sampling	Spatial Coverage GM#2/ 1 point location, 1 interval: 3300 KB/2606 MSL	Spatial Coverage GM#2/ 1 point location, 1 interval: 3450 KB/2756 MSL		Permittee has determined that the St. Peter has greater permeability at the proposed depth and this will facilitate collecting fluid samples.
30	C	12	Table 5 Quaternary Strata Fluid Sampling	Spatial Coverage MVA11LG - 135 ft MVA13LG - 140 ft	Spatial Coverage MVA11LG - 107 ft MVA13LG - 80 ft		MVA11LG should be at a depth of 107' and MVA13LG should be at a depth of 80'.
31	C	14	Table 7 Quaternary Strata Fluid Sampling	Parameters Water Density(field) Analytical Methods Oscillating body method	Parameters Water Density(field) Analytical Methods Oscillating body method		Permittee does not plan to measure the shallow groundwater density. Delete reference to Water Density in this table.
32	E	5	Table 3 Quaternary Strata Fluid Sampling	Parameters Water Density(field) Analytical Methods Oscillating body method	Parameters Water Density(field) Analytical Methods Oscillating body method		Permittee does not plan to measure the shallow groundwater density. Delete reference to Water Density in this table.
33	E	13	Evaluation of CO2 Plume	Also, limited 2D and 3D seismic surveys may be employed to determine the plume location at specific times.	Also, limited 2D and 3D seismic surveys may be employed to determine the plume location at specific times. Figure 5 presents an example of how the data from a time lapse 3D seismic surveys may be correlated against the model prediction.		No reference to Figure 5 in the text. Added text for clarity.
34	G	2	Tubing Specification	Outside Diameter (inches) 4 1/2	Outside Diameter (inches) 5 1/2		Tubing size is incorrectly stated as 4 1/2". Tubing size is 5 1/2" 17#.
35	QASP	6	Table 1	Table 1 on Page 6.	Delete Table 1 from Page 6 but include the notes at the bottom of the table.		Duplication of previous page, last 2 lines can be removed or combined. Line 1 should be "direct geochemical measurement" rather than "groundwater monitoring"
36	QASP	13	Table 4 Quaternary Strata Fluid Sampling	Parameters Water Density(field) Analytical Methods Oscillating body method	Parameters Water Density(field) Analytical Methods Oscillating body method		Permittee does not plan to measure the shallow groundwater density. Delete reference to Water Density in this table.
37	QASP	18	Table 10 Westbay Pressures (MOSDAX)	Detection Limit +/- 0.001 psi Precision +/- 0.01 psi	Detection Limit +/- 0.01 psi Precision +/- 0.1 psi		Revise detection limit and precision for WB MOSDAX probes.
38	QASP	19	A.4.b. Precision	For groundwater sampling, data accuracy will be assessed by the collection and analysis of field blanks to test sampling procedures and matrix spikes to test lab procedures. Field blanks will be taken no less than one per sampling day to spot check for sample bottle contamination. Laboratory assessment of analytical precision will be the responsibility of the individual laboratories per their standard operating procedures.	For groundwater sampling, data accuracy will be assessed by the collection and analysis of field blanks to test sampling procedures and matrix spikes to test lab procedures. Field blanks will be taken no less than one per sampling day event to spot check for sample bottle contamination. Laboratory assessment of analytical precision will be the responsibility of the individual laboratories per their standard operating procedures.		Permittee will take field blanks no less than one per sampling event.
39	QASP	20	A.4.g. Method Sensitivity	Table 14-- Table 19 provide additional details on gauge specifications and sensitivities.	Tables 14--19 provide additional details on gauge specifications and sensitivities.		There is a typo there shouldn't be a carriage return between "Table 14--" and "Table 19 - ..."

Item #	Document	Page	Provision	Text of Draft Permit or Attachment	Proposed Revision	Reference	Comment
40	QASP	25	B.1.f. Critical/Informational Data	During both groundwater sampling and analytical efforts, detailed field and laboratory documentation will be taken. Documentation will be recorded in field and laboratory forms and notebooks. Critical information will include time and date of activity, person/s performing activity, location of activity (wellfield sampling) or instrument (lab analysis), field or laboratory instrument calibration data, purge volume, field parameter values. For laboratory analyses, much of the critical data are generated during the analysis and provided to end users in digital and printed formats. Noncritical data may include appearance and odor of the sample, problems with well or sampling equipment, and weather conditions.	During both groundwater sampling and analytical efforts, detailed field and laboratory documentation will be taken. Documentation will be recorded in field and laboratory forms and notebooks. Critical information will include time and date of activity, person/s performing activity, location of activity (wellfield sampling) or instrument (lab analysis), field or laboratory instrument calibration data, purge volume , field parameter values. For laboratory analyses, much of the critical data are generated during the analysis and provided to end users in digital and printed formats. Noncritical data may include appearance and odor of the sample, problems with well or sampling equipment, and weather conditions.		Permittee does not plan to record groundwater sample purge volumes. This would be difficult or impossible to measure or calculate.
41	QASP	25	B.1.g. Sources of Variability	(7) conducting laboratory quality assurance checks using third party reference materials, blind and replicate sample checks, and	(7) conducting laboratory quality assurance checks using third party reference materials, and/or blind, and/or replicate sample checks, and		On page 25, under Sources of Variability, it mentions conducting lab quality checks using third party reference materials, and blind and replicate sample checks. This should have an "or" instead of "and" we do not do all of these.
42	QASP	30	B.3. Sample Handling and Custody	Sample holding times (Table 22) will be consistent with those described in US EPA (1974), American Public Health Association (APHA, 2005), Wood (1976), and ASTM Method D6517-00 (2005). After collection, samples will be placed in ice chests in the field and maintained thereafter at approximately 4°C until analysis. The samples will be maintained at their preservation temperature and sent to the designated laboratory within 24 hours. Analysis of the samples will be completed within the holding time listed in Table 22.	Sample holding times (Table 22) will be consistent with those described in US EPA (1974), American Public Health Association (APHA, 2005), Wood (1976), and ASTM Method D6517-00 (2005). After collection, samples will be placed in ice chests in the field and maintained thereafter at approximately 4°C until analysis. The samples will be maintained at their preservation temperature and sent to the designated laboratory within 24 hours. Analysis of the samples will be completed within the holding time listed in Table 22. As appropriate, alternative sample containers and preservation techniques will be used to meet analytical requirements.		Permittee may need to modify sample containers and preservation techniques but these techniques will be used to meet analytical requirements.
43	QASP	V	Table of Contents	ASTM, 2005, Method D6452-99 (reapproved 2005), Standard Guide for Purging Methods for Wells Used for Ground-Water Quality Investigations, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA.	ASTM, 2005, Method D6452-99 (reapproved 2005), Standard Guide for Purging Methods for Wells Used for Ground-Water Quality Investigations, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA.		Error in the table of contents. An actual reference is listed in the table of contents and should be deleted from this table.

Greenhagen, Andrew

From: ADMComments
Sent: Thursday, June 19, 2014 1:27 PM
To: Greenhagen, Andrew
Subject: FW: ADM Draft Permit IL-115-6A-0001 Comments
Attachments: ADM Comments Final.pdf; ATT00001.htm

From: Jay Duffy [mailto:jduffy@catf.us]
Sent: Friday, May 30, 2014 2:31 PM
To: ADMComments
Cc: Ann weeks; Bruce Hill
Subject: ADM Draft Permit IL-115-6A-0001 Comments

Mr. Batka,

On behalf of the Ann Weeks and Bruce Hill, attached please find comments of the Clean Air Task Force on the ADM Class VI Draft Permit.

Thank you.

May 30, 2014

Via Electronic Mail

Allan Batka

U.S. EPA Region 5

77 W. Jackson Blvd. (WU-16J)

Chicago, IL 60604-3590

ADMComments@epa.gov

Re: Comments of the Clean Air Task Force on ADM Carbon Sequestration Draft Permit

Mr. Batka,

Clean Air Task Force (“CATF”) is pleased to have the opportunity to comment on Archer Daniels Midland’s (“ADM’s”) draft Underground Injection Control (“UIC”) Class VI permit. Draft Permit IL-115-6A-0001 is issued pursuant to the Safe Drinking Water Act (“SDWA”) and the UIC regulations codified at 40 CFR parts 124, 144, 146, 147. Founded in 1996, CATF is a nonprofit organization dedicated to restoring clean air and healthy environments through scientific research, public education and legal advocacy.

The overwhelming majority of climate scientists agree that our climate is changing due to manmade carbon dioxide (“CO₂”) emissions.¹ For the foreseeable future, carbon capture and storage technologies will be critical to meeting global greenhouse gas reduction goals. Carbon capture and storage is highly likely to be the only technology proven and available for isolation from atmospheric release of the large amounts of CO₂ emitted from these sources. The ADM project has already, and will continue to advance geologic storage technologies. This project therefore is critical to advancing commercial scale geologic carbon storage.

The Draft Permit is associated with the Illinois Basin Decatur CCS Project (“the Project”), which involves the compression and dehydration of CO₂ separated at ADM’s corn-to-ethanol plant, and its storage in a deep saline aquifer adjacent to the producing plant. To date, 700,000 metric tons of CO₂ captured from the plant already have been successfully injected in the first onsite 7,000-foot deep saline injection well, previously permitted under UIC Class I. A vigorous monitoring program to track CO₂ in the subsurface and ensure its security in the subsurface has accompanied injection. As a result, the Draft Permit enjoys the advantage of a track record that demonstrates its ongoing success. More specifically, the Project illustrates the

¹ John Cook, *et al.*, *Quantifying the consensus on anthropogenic global warming in the scientific literature*, 8 **Environ. Res. Lett.** 024024 (May 13, 2013), available at: http://iopscience.iop.org/1748-9326/8/2/024024/pdf/1748-9326_8_2_024024.pdf.

safe and successful use of the Mount Simon Formation for geologic carbon storage in the Illinois basin. During the 3-year injection program, 1.1 Mt of CO₂ are being captured at ADM's ethanol plant using Alstom's amine capture process and will be injected into the Cambrian Mt. Simon Formation.² Monitoring tools utilized at the site include four shallow groundwater wells and soil gas measurements including soil fluxes, 3-D seismic profiling, ground deformation by satellite interferometry, open and cased-hole logging, a dedicated monitoring well with embedded geophones for walk-away vertical seismic profiling and a dedicated in-zone monitoring well and including Schlumberger's Westbay system.³ Monitoring began in 2009 and will conclude in 2017 after a three-year post-injection monitoring period.⁴ After two years of pre-injection data, and one year of injection, no effects of injection have been detected outside the reservoir.⁵

Once this permit is approved, there will be two injection wells at the Project site: CCS #1 (the currently operating Class I well) and CCS #2. The Draft Permit is for CCS #2, a new injection well, which has a projected operational period of five years, and an expected total injection volume of 5.5 Mt of CO₂. EPA also has received and is reviewing for adequacy an application to transition the initial CCS #1 well to a Class VI UIC permit. ADM has long awaited final permits -- both the application to transition CCS #1 to Class VI, and the application for the CCS #2 Class VI permit were submitted in 2011. While it is understandable that the Agency is careful with these first Class VI permit reviews, it also is critical that EPA move expeditiously to permit projects that allow companies, scientists and EPA to gain experience in commercial-scale saline geologic storage and thus carbon capture and sequestration technology.

We have reviewed the ADM's Class VI Draft Permit for CCS #2, against the technical criteria of the UIC Class VI rules, which are intended to ensure that geologic sequestration is conducted in a manner that protects underground sources of drinking water ("USDWs") from endangerment. CATF's review finds the Draft Permit's methodologies to be robust and in keeping with the requirements of the rules, including the Area of Review and Corrective Action plan, a comprehensive Testing and Monitoring Plan (including advanced monitoring and testing techniques in the USDWs and the zone above the confining zone) an Injection Well Plugging Plan, and a Post Injection Site Care Plan. While we anticipate that it is unlikely that this aspect of the Draft Permit will be needed, it is nevertheless consistent with the regulations and wise for the applicant to include with the Draft Permit an Emergency and Remedial Response Plan that anticipates induced seismicity and includes provisions for monitoring, response and shut down.

² U.S. EPA, "Public Comment Sought on Carbon Storage Draft Permit," (Apr. 2014), *available at*: <http://www.epa.gov/region5/water/uic/adm/pdfs/adm-fact-sheet-201404.pdf>.

³ U.S. EPA, "ADM Permit Application for CCS#1," (Dec. 2011), *available at*: <http://www.epa.gov/region5/water/uic/adm/pdfs/adm-ccs1-permit-application-201112.pdf>; U.S. EPA, "ADM Permit Application for CCS#2," (July, 2011), *available at*: <http://www.epa.gov/region5/water/uic/adm/pdfs/adm-ccs2-permit-application-201107.pdf>.

⁴ MIT, "Decatur Fact Sheet," <https://sequestration.mit.edu/tools/projects/decat.html>.

⁵ See generally, Ozgur Senel, Nikita Chugunov, *CO2 Injection in a Saline Formation: Pre-Injection Reservoir Modeling and Uncertainty Analysis for Illinois Basin – Decatur Project*, 37 **Energy Procedia** 4598-4611 (2013), *available at*: http://ac.els-cdn.com/S1876610213006115/1-s2.0-S1876610213006115-main.pdf?_tid=68b117a2-ca31-11e3-ae0a-00000aach35f&acdnat=1398180111_0cd7142f4524b3afb688484473f29a5a.

CATF urges EPA to grant the final permit as expeditiously as possible.

Respectfully submitted,

/s/Bruce Hill, Ph.D.

L. Bruce Hill, Ph.D.
Chief Geoscientist
bruce@catf.us

/s/Ann Brewster Weeks

Ann Brewster Weeks
Senior Counsel and Legal Director
aweeks@catf.us

Clean Air Task Force
18 Tremont St.
Boston, MA 02108
617-624-0234

Greenhagen, Andrew

From: ADMComments
Sent: Thursday, June 19, 2014 1:27 PM
To: Greenhagen, Andrew
Subject: FW: NRDC comments on draft ADM Class VI injection well permit
Attachments: ADM_ClassVIPermitApplication_NRDC Comments_30May2014.pdf

From: Peridas, George [mailto:gperidas@nrdc.org]
Sent: Saturday, May 31, 2014 12:04 AM
To: ADMComments
Cc: Mordick, Briana
Subject: NRDC comments on draft ADM Class VI injection well permit

Dear Allan,

Please find attached comments of the Natural Resources Defense Council on the draft Class VI injection permit for the ADM Carbon Sequestration project.

We appreciate the opportunity to comment and thank you for your consideration.

George Peridas, Ph.D.
Scientist, Climate Center
Deputy Director, Science Center

Natural Resources Defense Council
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View my blog at: <http://switchboard.nrdc.org/blogs/gperidas/>

 *Save paper – think before printing!*

**BEFORE THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 5**

Archer Daniels Midland Permit Application)
For Class VI Wells)
Under the Underground Injection Control (UIC))
Program)

Comments of:
Natural Resources Defense Council

A. Introduction

NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has 1.4 million members and online activists nationwide, served from offices in New York, Washington D.C., San Francisco, Los Angeles, Chicago and Beijing.

B. Comments

General comments

This permit application is significant, in that it represents one of the first efforts to permit a CO₂ sequestration project using EPA's December 2010 Safe Drinking Water Act Underground Injection Control Program ("UIC") Class VI rules. Precedents may be set, with respect to what applicants look to in submitting in future applications. And through this review, EPA sends an important message about how it intends to implement the UIC Class VI regulations.

At the outset, we commend Archer Daniels Midland (hereinafter "the Applicant", or "Applicant") for compiling an application that is clear and that attempts to address most of the requirements of Class VI in a considered manner. While we may have questions or suggestions with respect to specific parts of the application, overall we are encouraged by the approach taken in evaluating and operating the site, as well as the conciseness with which information is presented.

We do list a number of technical points below for EPA's consideration and resolution, and we can see a clear pathway forward for the issuance of the injection permits under consideration here, as we believe that our comments can be readily addressed by the Applicant and EPA. We support this effort, and hope that it can be the precursor to more opportunities to permanently remove carbon pollution from the atmosphere and sequester it safely in the deep subsurface.

Technical comments

Logging, Sampling, & Testing

1. The logging, sampling, and testing provisions at 40 CFR 146.87 require owners or operators of Class VI wells to collect various data during and after drilling of the injection well. The permit application does not appear to include provisions to perform some of these tests and/or obtain samples as required by the following sections:
 - a. 40 CFR 146.87(c): The owner or operator must record the fluid temperature, pH, conductivity, reservoir pressure, and static fluid level of the injection zone(s).
 - b. 40 CFR 146.87(d)(1)-(3): At a minimum, the owner or operator must determine or calculate the following information concerning the injection and confining zone(s): Fracture pressure; Other physical and chemical characteristics of the injection and confining zone(s); and Physical and chemical characteristics of the formation fluids in the injection zone(s).

Such site-specific data is necessary to accurately calculate the AOR and determine appropriate operating conditions such as the maximum allowable injection pressure. EPA must require the Applicant to perform these tests and/or obtain samples as required by Class VI rules.

Area of Review ("AOR") and Corrective Action

1. It appears that the Applicant relied on well records reviews to identify possible penetrations of the confining zone. The Applicant should provide additional details as to the exact methods that were used to identify existing wells, including a more extensive discussion of the history of the site and any past uses to aid in determining whether other undocumented wells are likely to exist in the AOR. The Applicant must justify a decision to not deploy more advanced methods of locating undocumented wells, such as aeromagnetic surveys. Improperly constructed, maintained, and/or abandoned wells are one of the most likely pathways by which injected fluids may reach USDWs, as has been evidenced by surface leakage of CO₂ at oil fields such as Salt Creek in Wyoming. EPA must require the use of such methods prior to injection if the current sources of information are not sufficiently trustworthy.
2. Given that injection will only occur for five years, and an alternate Post-Injection Site Care (PISC) timeframe of ten years is proposed, the requirement to re-evaluate the AOR every five years may not be sufficient. EPA should consider requiring a more frequent re-evaluation of the AOR, given the short timeframe of the project.

Testing and Monitoring

1. We support Applicant's proposal to perform passive microseismic monitoring to help identify induced seismicity that may be caused by injection operations. However, we suggest that EPA require additional information and planning to address the risk of induced seismicity. Documented incidences of induced seismicity caused by UIC Class II injection operations have

often occurred on previously unknown and/or sub-seismic faults.¹ According to the comprehensive report on induced seismicity and energy technologies produced by the National Academy of Sciences, “The factor that appears to have the most direct consequence in regard to induced seismicity is the net fluid balance (total balance of fluid introduced into or removed from the subsurface)...”² Projects that do not balance injection and withdrawal, like carbon capture and sequestration or storage (“CCS”), may have a greater potential to cause induced seismicity, although more research is needed. Induced earthquakes caused by Class II injection operations have been large enough to cause property damage and injury.³ Even in the absence of actual damage, induced seismicity is a nuisance and source of anxiety for nearby communities, and may undermine public trust and support for CCS projects. Researchers at Lawrence Berkeley National Laboratory⁴ and the National Academy of Sciences⁵ have published detailed information on the elements that should be considered for inclusion in a protocol for addressing induced seismicity, including but not limited to 1) a stakeholder communications and outreach plan; 2) criteria for ground vibration and noise; 3) a hazard assessment; 4) a risk assessment; 5) seismic monitoring, and; 6) mitigation plans. Using these guidelines we request that EPA require Applicant to develop a protocol to address induced seismicity.

2. Table 9 in the Testing and Monitoring Plan indicates that a repeat 3D surface seismic survey will be performed in Year 2 of injection, but planned activities are not described in the permit. The Applicant should provide additional details about the planned repeat seismic survey, including a discussion of why only one repeat survey will be performed, and conditions that could potentially affect this decision and trigger additional repeat surveys.

Post Injection Site Care

1. We note that contact of CO₂ with the confining zone (Eau Claire) is not projected to occur during the injection period or within the 10-year PISC timeframe, meaning that the ability of the Eau Claire to serve as an appropriate confining zone will not have been tested in practice when the PISC period ends. Although available data indicates that the geologic and geomechanical properties of the Eau Claire are excellent for a confining zone, the position of the CO₂ plume should be given further consideration in the alternate PISC timeframe approval. The Applicant should discuss the projected time when the CO₂ plume is projected to contact the Eau Claire, the possibility of faults or fractures compromise is theoretical and projected properties as a confining zone and any testing or monitoring during the injection period that will be used to identify those. Although we do not necessarily question the proposed 10-year PISC as inappropriate, EPA

¹ Ohio Department of Natural Resources. (2012). Preliminary Report on the Northstar 1 Class II Injection Well and the Seismic Events in the Youngstown, Ohio, Area.

² Clarke, D., Detournay, E., Diederich, J., Dillon, D., Green, S., Habiger, R., ... & Smith, J. (2012). *Induced seismicity potential in energy technologies*. National Academies Press.

³ Keranen, K. M., Savage, H. M., Abers, G. A., & Cochran, E. S. (2013). Potentially induced earthquakes in Oklahoma, USA: Links between wastewater injection and the 2011 Mw 5.7 earthquake sequence. *Geology*, 41(6), 699-702.

⁴ See, e.g. Majer, E., Nelson, J., Robertson-Tait, A., Savy, J., & Wong, I. (2012). Protocol for addressing induced seismicity associated with enhanced geothermal systems. *US Department of Energy*; Majer, E., Nelson, J., Robertson-Tait, A., Savy, J., & Wong, I. (2013). Best Practices for Addressing Induced Seismicity Associated With Enhanced Geothermal Systems (EGS). *US Department of Energy*.

⁵ *Id.* fn 3.

should consider the reliability of existing information at this point when setting the PISC duration to 10 years and also when evaluating whether the appropriate criteria for closure have been met when the Applicant applies for closure.

C. Conclusion

We look forward to continuing to work with permit applicants and the EPA on the implementation of the Class VI rule and other efforts under the Agency's existing authority to address the significant problem of climate change in the near term.

Respectfully submitted on May 30th, 2014.

Briana Mordick, Natural Resources Defense Council

111 Sutter St, 20th Floor, San Francisco, CA 94104, 415-875-8270, bmordick@nrdc.org

George Peridas, Natural Resources Defense Council

111 Sutter St, 20th Floor, San Francisco, CA 94104, 415-875-6181, gperidas@nrdc.org

Greenhagen, Andrew

From: Batka, Allan
Sent: Wednesday, July 02, 2014 1:04 PM
To: Greenhagen, Andrew
Subject: FW: Public Comment on the ADM UIC Draft Permit
Attachments: Allan Batka USEPA Reg 5_5-19-2014.pdf

From: Gilmore, Tyler J [mailto:Tyler.Gilmore@pnnl.gov]
Sent: Thursday, May 22, 2014 5:57 PM
To: Batka, Allan
Cc: Appriou, Delphine; Lucinda Swartz
Subject: Public Comment on the ADM UIC Draft Permit

Mr Batka,
Attached is a letter with our comments on the ADM Draft Permit Well 1 (IL-115-6A-001). Please accept these as part of the public comment process.
Thank you
Tyler Gilmore

*Tyler Gilmore
Lead Geologist FutureGen Storage Site
509 371 7171*



FutureGen Industrial Alliance
73 Central Park Plaza E
Jacksonville, IL 62650
Contact: Tyler Gilmore
Tel: (509) 371-7171
tyler.gilmore@pnnl.gov

May 19, 2014

Allan Batka
U.S. EPA Region 5
77 W. Jackson Blvd. (WU-16J)
Chicago, IL 60604-3507

Subject: U.S. Environmental Protection Agency (EPA) Underground Injection Control (UIC) Class VI Draft Permits for Archer Daniels Midland (ADM) Carbon Sequestration – Comments

Dear Mr. Batka:

I am writing to express my strong support to the ADM Underground Injection Control (UIC) Class VI permit.

The implementation of the new class of wells, class VI, developed under the authority of the Safe Drinking Water Act's UIC, is specially designed to protect underground sources of drinking water (USDW). My analysis of the UIC draft permit indicates that the ADM project fully addresses the requirements to insure safe storage over short and long periods of time.

The ADM site is located in a central position within the Illinois basin, and exhibits excellent geological conditions for CO₂ storage. The Cambrian Mt Simon sandstone at the ADM site is greater than 1,500 ft. thick, with a large, proven storage capacity, and the well-developed Eau Claire regional seal (>700 ft.) has well-documented low permeability values.

Extensive geological, geophysical and petrophysical characterization data were collected at the ADM site to build robust three-dimensional (3D) geological and numerical models. The 3D VSP and surface seismic survey do not show evidence of presence of faults in either the injection or the confining zone. The fracture gradients determined both in the injection and confining zones suggest that it is extremely unlikely that any fractures initiated in the injection zone could extend through the seal. Technical presentations on the reservoir and seal quality are publically available <http://www.sequestration.org/resources/reports.html>. This transparency of the existing IBDP project has built enthusiastic sequestration-community technical support of the current and proposed sequestration projects at the ADM Decatur site.

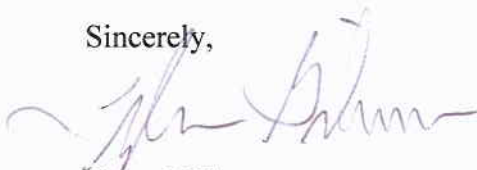
Because large volumes of CO₂ (1000 metric tons/day average) have been injected in the Mount Simon sandstone at the Decatur site since November 2011 without significantly raising reservoir pressure, the applicant has an excellent understanding of the in-situ conditions and has been able to evaluate and calibrate the original 3D-geologic and numerical models. The quantity of available characterization data, the current comprehension of in-situ conditions and the feedback from the on-going injection process, as presented in a transparent manner to the global sequestration community, support that the reservoir quality and seals are excellent and that the site is safe in regard to the protection of underground sources of drinking water.

In regard to potential CO₂ leakage paths in the Area of Review, only three wells penetrate the confining zone and all of them were drilled and used for the needs of the Illinois Basin-Decatur Project (IBDP). There is a clear knowledge of the state of construction of these wells and none requires corrective action prior the initiation of injection. It is also important to note that the existing domestic water wells have a depth of less than 200 ft. The actual lowermost USDW considered for this permit is the St Peter Sandstone formation, which is at depth greater than 3,200 ft. The monitoring efforts, methods of measurements, and the verification and accounting protocols implemented on the site to ensure safe and effective sequestration operations appear to be extremely protective of both the USDW and the shallow drinking water aquifers.

Finally, before the issuance of this permit, ADM already demonstrated that the proposed site was able to successfully and safely store about 800,000 metric tons of carbon dioxide, which otherwise would have been released in the atmosphere. The project is part of the Midwest Geological Sequestration Consortium, one of the seven Regional Carbon Sequestration Partnerships created by the Department of Energy (DOE) and its partners have an internationally recognized technical expertise in the carbon capture and storage field.

In summary, I fully encourage U.S. EPA to issue the final UIC permit approval to ADM. I do believe that the injection and the state-of-the-art-monitoring activities implemented on the sequestration site will guarantee a safe storage over time and will be protective of the USDW. The success of this first-of-its-kind project will also be a milestone in the Carbon Sequestration history and will contribute to limit climate change concerns.

Sincerely,



Tyler J Gilmore
Storage Site Lead, FutureGen Alliance

JANE ROSE REPORTING

rose

800-825-3341

74 FIFTH AVENUE NYC 10011
JANE ROSE REPORTING.COM
JANE ROSE @ JANE ROSE REPORTING.COM

County of Macon - Illinois

**Underground
Injection Control
Draft Permits
Archer Daniels
Midland Company**

**Public Hearing
May 21, 2014**

Page 1

STATE OF ILLINOIS
IN THE COUNTY OF MACON

UNDERGROUND INJECTION CONTROL
DRAFT PERMITS
ARCHER DANIELS MIDLAND COMPANY

PUBLIC HEARING
May 21, 2014
Decatur Public Library
Decatur, Illinois
Steve Jann, EPA Hearing Officer

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Page 2

APPEARANCES

Steve Jann, Hearing Officer
Environmental Protection Agency Region 5

Allan Batka
Environmental Protection Agency Region 5

Mary Rose (Molly) Bayer,
Environmental Protection Agency

Teresa Jones, Hearing Facilitator

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Robin L. Stranimeier, CSR-084-004700, RPR

Page 3

1 (7:00 p.m.)

2 MR. JANN: I'd like to begin if we can.

3 Good evening. Welcome. This U.S. Environmental
4 Protection Agency's proposal to issue a permit to the
5 Archer Daniels Midland Company for a proposed injection
6 well. Archer Daniels Midland Company or ADM wants the
7 permit to inject carbon dioxide deep underground.

8 My name is Steve Jann. I am the Chief of
9 the Underground Injection Control Branch at EPA Region
10 5 in Chicago and I will preside over this hearing.
11 Joining me on the panel today are Allan Batka and Molly
12 Bayer. Allen is with my office in Chicago, EPA Region
13 5 and Molly works out of the EPA's office in
14 Washington, DC.

15 We are pleased to have the opportunity to
16 listen to your comments on EPA's draft permit decision.
17 In 2011 EPA received a permit application from ADM for
18 an underground injection well. The application was on
19 EPA's website. The full list of information we have
20 reviewed is also on EPA's website. The information can
21 be viewed in person at EPA's Chicago office.

22 The comment period on the draft permit
23 ends on May 30th. Comments can be made either here,
24 spoken or in writing. They can also be sent to EPA by
25 e-mail, regular mail, fax or by entering a form on our

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1 website.

2 We are holding this hearing in accordance
3 with regulations under the Safe Drinking Water Act.
4 The hearing is designed to allow you to make comments
5 for EPA to consider in making any final permit
6 decision. All of the comments we receive during this
7 hearing will become part of the official record for
8 this draft permit, but we will not be responding to
9 your comments this evening. EPA will review all
10 comments after the public comment period ends.

11 We will then prepare a document what we
12 call a "Responsiveness Summary." That document will
13 respond to all significant comments on the draft permit
14 and will be posted on the Region 5 Website. The time
15 needed to prepare a Responsiveness Summary will depend
16 on the volume and the nature of comments we receive.

17 When EPA reviews the comments and prepares
18 the Responsiveness Summary, EPA will make a decision to
19 issue the permit or deny the permit application. At
20 the same time the Responsiveness Summary is sent out,
21 we will send a letter notifying ADM whether we have
22 issued the permit or denied the application. If EPA
23 issues the permit, the permit will authorize ADM to
24 construct the well.

25 Before we begin, here's a brief background

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1 on the Safe Drinking Water Act, the Underground
2 Injection Control program and the permit application we
3 reviewed. The Safe Drinking Water Act has three main
4 parts. One sets drinking water standards, another
5 generally protects ground water, and the third is the
6 Underground Injection Control, or as we call it the UIC
7 program.

8 EPA developed regulations for the UIC
9 program with the goal of protecting underground sources
10 of drinking water from the potential effects of
11 injected fluid. EPA finalized regulations for Class VI
12 wells in 2010. Class VI wells inject carbon dioxide
13 underground for permanent storage or sequestration.

14 The UIC program protects underground
15 sources of drinking water by permitting only those
16 injection wells which meet stringent technical
17 requirements. The program ensures public participation
18 in the permitting process. The public is invited to
19 comment on every draft permit decision. EPA holds
20 public hearings for those permit decisions that
21 generate significant public interest.

22 EPA received the ADM permit application in
23 July of 2011. EPA thoroughly reviewed the application
24 using experts from various EPA offices as well as
25 contractors. EPA has determined that the proposed

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1 injection activity should protect underground sources
2 of drinking water and the environment. Therefore, EPA
3 is making the draft permit available for public review
4 and comment.

5 EPA announced the draft decision and this
6 hearing on April 16, 2014. The announcement was
7 published in the Decatur Herald and Review here in
8 Decatur on April 17th. EPA also posted the
9 announcement on our web page. EPA sent a copy of the
10 draft permit to the Decatur Public Library on April
11 15th. Announcements were also mailed and e-mailed to
12 interested parties, State and federal agencies, and
13 land owners near the proposed injection well. EPA held
14 two open houses earlier today. One from 11:00 to 1:00
15 and another one concluding a few minutes ago at 7:00.

16 A public hearing is more formal than an
17 open house and it has a different purpose. At an open
18 house, EPA engages in a discussion with people about
19 the draft permit in which all parties can ask
20 questions, share information, and develop a greater
21 understanding of the issues involved.

22 In contrast, a public hearing gives people
23 an opportunity to formally and publicly make EPA aware
24 of their views on the draft permit. All oral
25 statements are being recorded word for word by our

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1 court reporter, but you are not sworn in and we will
2 not be asking any questions of you. This hearing is
3 your opportunity to tell EPA whether you feel the
4 proposed permit is consistent with the Safe Drinking
5 Water Act and EPA's underground Injection Control
6 regulations and whether the facts, as determined by
7 EPA, are accurate.

8 EPA's role during the public hearing is to
9 listen to each comment that is made. We will not
10 respond to your comments this evening. However, as I
11 said a moment ago, we will prepare a Responsiveness
12 Summary responding to all significant comments on the
13 draft permit. EPA will add the Responsiveness Summary
14 to the administrative record for this permitting
15 decision.

16 After considering all comments, EPA will
17 make its decision to issue a permit or deny the
18 application. The final decision may be appealed to
19 EPA's Environmental Appeals Board by a person who
20 submits written comments on the draft permit during the
21 public comment period or makes oral comments at the
22 hearing tonight.

23 If you wish to make a statement at this
24 hearing, please be sure to provide your information at
25 our registration table so that we may correctly enter

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1 your name into the hearing record. Even if you choose
2 not to make a statement but want to receive a copy of
3 any response for the final permit decision, make sure
4 that you have indicated so by signing in on the sign-in
5 sheet at the table.

6 We do want to make sure that everyone who
7 wants to say something gets the opportunity to do so,
8 and I understand that one person has signed up to speak
9 so we will have ample opportunity for folks to make
10 talk if they'd like to.

11 If you are mailing your comments to EPA,
12 this means that you should make sure your comments to
13 EPA are postmarked no later than May 30th. If you have
14 a written copy of your remarks, or other any other
15 documents that you would like to submit, please provide
16 them to Jeff. Who is sitting in the checked shirt over
17 here.

18 Okay. So when you start to speak, please
19 say your name and then spell your last name for our
20 court reporter. So on behalf of the EPA thank you for
21 coming to today's hearing and our first speaker will
22 be? The first and I understand only at this point.

23 MS. JONES: Evelyn Carter.

24 MS. CARTER: I'm not going to speak. I
25 think I spoke enough.

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1 MR. JANN: Well, just note that, you know,
2 our conversations earlier were informal and not part of
3 the official record for the process. So if you want to
4 restate any concerns and get a specific response from
5 EPA it would be important to express those concerns at
6 this time.

7 MS. CARTER: Well --

8 MR. JANN: It's your choice, but if you
9 could speak in the microphone that would be helpful.

10 MS. CARTER: My name is Evelyn Carter.

11 MS. JONES: Could you please spell your
12 name for the court reporter.

13 MS. CARTER: C-a-r-t-e-r. Evelyn,
14 E-v-e-l-y-n.

15 MS. JONES: Thank you.

16 MS. CARTER: I'll say this as succinctly
17 as I can. My concern is, of course, with this new idea
18 of this well being established here in the township of
19 Decatur -- or city of Decatur, I guess, the concern is
20 to the safety of the well and how ADM will be
21 responsive to the community if it's necessary. And
22 looking at those concerns that I voiced earlier of
23 trying to get the information which was very, very good
24 at explaining things to me and I understand this is to
25 try to keep the carbon dioxide out of the air, which I

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1 think is a good thing but I still want it to be known
2 that these concern still exists. Thank you.

3 MR. JANN: Thank you.

4 MS. JONES: Are there any others at this
5 time that would like to make a comment for the record?

6 Very well. If not, we're going to stick
7 around for the next couple of -- not the next couple of
8 hours. We're here until 9 o'clock. That's when the
9 hearing is scheduled to end. So if anyone decides to
10 make a comment at that time, feel free to do so. Thank
11 you.

12 (Hearing recessed at 7:15 p.m.)

13 (Hearing reconvened at 9:00 p.m.)

14 MR. JANN: This hearing is closed.

15

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CERTIFICATE OF REPORTER

STATE OF ILLINOIS)

) SS

COUNTY OF MACOUPIN)

I, Robin L. Stranimeier, hereby certify that I reported stenographically the foregoing proceedings at the time and place hereinbefore set forth; that thereafter the same was reduced to computer transcription under my supervision; and that this is a full, true, complete and correct transcription of said proceedings.

Dated: May 27, 2014.

Robin L. Stranimeier, CSR-084-004700, RPR
Notary Public,
Macoupin County, Illinois.
My Commission expires: 08/18/2014

<div><div>A</div><div>accurate 7:7 Act 4:3 5:1,3 7:5 activity 6:1 add 7:13 ADM 3:6,17 4:21,23 5:22 9:20 administrative 7:14 agencies 6:12 Agency 2:4,7,10 Agency's 3:4 ago 6:15 7:11 air 9:25 Allan 2:6 3:11 Allen 3:12 allow 4:4 ample 8:9 announced 6:5 announcement 6:6,9 Announcements 6:11 appealed 7:18 Appeals 7:19 APPEARANCES 2:1 application 3:17,18 4:19,22 5:2,22,23 7:18 April 6:6,8,10 Archer 1:7 3:5,6 asking 7:2 authorize 4:23 available 6:3 Avenue 2:18 aware 6:23</div></div>	<div><div>Class 5:11,12 closed 10:14 coming 8:21 comment 3:22 4:10 5:19 6:4 7:9,21 10:5 10:10 comments 3:16,23 4:4 4:6,9,10,13,16,17 7:10,12,16,20,21 8:11,12 Commission 11:21 community 9:21 Company 1:7 3:5,6 complete 11:11 computer 11:9 concern 9:17,19 10:2 concerns 9:4,5,22 concluding 6:15 consider 4:5 considering 7:16 consistent 7:4 construct 4:24 contractors 5:25 contrast 6:22 Control 1:5 3:9 5:2,6 7:5 conversations 9:2 copy 1:24 6:9 8:2,14 correct 11:11 correctly 7:25 County 1:2 11:4,20 couple 10:7,7 course 9:17 court 7:1 8:20 9:12 CSR-084-004700 2:21 11:18 C-a-r-t-e-r 9:13</div></div>	<div><div>different 6:17 dioxide 3:7 5:12 9:25 discussion 6:18 document 4:11,12 documents 8:15 draft 1:6 3:16,22 4:8 4:13 5:19 6:3,5,10 6:19,24 7:13,20 drinking 4:3 5:1,3,4,10 5:15 6:2 7:4</div></div>	<div><div>form 3:25 formal 6:16 formally 6:23 forth 11:8 free 10:10 full 3:19 11:11</div></div>	<div><div>Jann 1:15 2:3 3:2,8 9:1 9:8 10:3,14 Jeff 8:16 Joining 3:11 Jones 2:12 8:23 9:11 9:15 10:4 July 5:23</div></div>
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			<div><div>I</div><div>idea 9:17 Illinois 1:1,14 11:2,20 important 9:5 indicated 8:4 informal 9:2 information 3:19,20 6:20 7:24 9:23 inject 3:7 5:12 injected 5:11 injection 1:5 3:5,9,18 5:2,6,16 6:1,13 7:5 interest 5:21 interested 6:12 invited 5:18 involved 6:21 issue 3:4 4:19 7:17 issued 4:22 issues 4:23 6:21</div></div>	<div><div>M</div><div>MACON 1:2 Macoupin 11:4,20 mail 3:25 mailed 6:11 mailing 8:11 main 5:3 making 4:5 6:3 Mary 2:9 means 8:12 meet 5:16 microphone 9:9 Midland 1:7 3:5,6 minutes 6:15 Molly 2:9 3:11,13 moment 7:11</div></div>
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